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REVIEW OF THE INDO-PACIFIC ANEMONE FISHES, GENUS AMPHIPRION, WITH DESCRIPTIONS OF TWO NEW SPECIES.

By Leonard P. Schultz

During the summer of 1950 Dr. Arthur D. Welander, School o Fisheries, University of Washington, and I were engaged in studying reef fishes brought back from the Marshall Islands by the staff of the Applied Fisheries Laboratory of the University of Washington. Among this material was a specimen of anemone fish that we could not identify with any known species. After I returned to the U. S. National Museum, I reviewed the descriptions of all known species, compared that specimen with the numerous lots of *Amphiprion* in the National Museum, and found that it represented a new species. During March 1951, I studied the anemone fishes in the Museum of Comparative Zoology, Harvard University, and found another undescribed species from Mauritius.

Descriptions and analyses of species referable to the genus *Amphiprion* have been based on so few specimens, usually only one or two, that the problem of variability or constancy of the color pattern has been neglected. For most of the few hundred species among more than fifty fish families that I have studied in detail the basic color pattern has been observed to be fairly constant. It is of great value for the recognition of species, especially in the genus *Amphiprion*. Weber and de Beaufort (The fishes of the Indo-Australian Archipelago, vol. 8, pp. 330–348, 1940) recognized eight species, whereas we have distinguished fourteen and there may be others recognizable when larger series are compared and additional characters studied. Fin ray counts were made on various species and these data are recorded in table 1.

Except for original descriptions, no attempt was made to include all references to species referable to the genus *Amphiprion*. Whenever

figures of species were found these have been included in the synonymy. Most descriptions and records are not in sufficient detail to assign them to the correct species without examining the material on which the records were based.

Genus *Amphiprion* Bloch and Schneider

Amphiprion Bloch and Schneider, Systema ichthyologiae . . ., p. 200, 1801 (genotype, *Lutjanus ephippium* Bloch).

Prochilus (on Klein, 1775) Bleeker, Nat. Verh. Hollandsche Maatsch. Wet. Haarlem, ser. 3, vol. 2, No. 6, p. 20, 1877 (genotype, *Lutjanus ephippium* Bloch).

Actinicola Fowler, Journ. Acad. Nat. Sci. Philadelphia, ser. 2, vol. 12, p. 533, 1904 (genotype, *Lutjanus percula* Lacepède).

Phalerebus Whitley, Mem. Queensland Mus., vol. 9, pt. 3, p. 216, 1929 (genotype, *Prochilus akallopisos* Bleeker).

Key to the species of Amphiprion

1*a*. A white band (sometimes indistinct) along middorsal line from snout to dorsal origin or beyond along base of dorsal fin; total pectoral rays 17 to 19; next to last dorsal spine about 1.3 to 1.5 in longest dorsal spine; no notable emargination in dorsal fin; scales on dorsal surface of head extend forward to a line between front of orbits.

2*a*. No vertical pale bars; dorsal rays about X,18 or 19; anal about II,12 or 13; pectoral 17 to 19 ..... **A. akallopisos** Bleeker

2*b*. A single vertical pale bar about 2 scales wide from nape to subopercle; dorsal rays about X,16; anal about II,12 or 13; pectoral 17. **A. perideraion** Bleeker

1*b*. No white band along middorsal line.

3*a*. Caudal fin with pale or dusky roundish center posteriorly edged with black; outer edges of caudal fin white; second pale or white bar from rear of spiny dorsal fin to anus with a triangular anterior projection under depressed pectoral fin; tips of pelvics black; a broad white color bar on head and on caudal peduncle always present. Dorsal fin deeply indented at rear of spiny part, next to last dorsal spine contained three times in longest dorsal spine; scales on dorsal surface of head do not extend forward of nape ..... **A. percula** (Lacepède)

3*b*. Color not as in *A. percula*.

4*a*. Central part of caudal fin black; outer edges of caudal fin broadly or narrowly edged with white; second pale bar, if present, without any projection anteriorly; pale bar on head present; next to last dorsal spine contained 1.2 to 2.0 times in longest dorsal spine; no notable emargination in dorsal fin.

5*a*. Second pale bar represented dorsally on body by an ovate white area that continues anterodistally on soft dorsal fin; this white area does not extend below midlengthwise axis of body and never to anus; first pale bar 10 to 12 scales wide; anal fin black, except distally edged with white; spiny dorsal black; pelvics black; pectoral pale, except basally blackish; next to last dorsal spine contained about 1.2 to 1.5 in longest dorsal spine; no notable emargination in dorsal fin; scales on dorsal surface of head extend forward to a line between rear of orbits. **A. laticlavius** Cuvier and Valenciennes

5*b*. Second pale bar continuous from dorsal part of body to region of anus.

6*a*. Second pale bar broad, about 7 to 14 scales wide at level of lateral line (its width there contained 2 or less times in width of third black bar at level of lateral line) from whence it continues posterodorsally on soft dorsal fin; pelvics dusky to blackish; spiny dorsal blackish; anal blackish, at least basally; scales on dorsal surface of head extend forward to a line between rear of orbits.

7*a*. Caudal peduncle with broad white bar; pectoral fin pale distally, basally dusky.

A. chrysogaster Cuvier and Valenciennes

7*b*. Caudal peduncle black; no white bar; black coloration of posterior part of body continues on central part of caudal fin; pectoral fin dusky in basal third_**A. polymnus** (Linnaeus)

6*b*. Second pale bar narrow, about 2 to 6 scales wide at level of lateral line, its width there contained 3.5 or more times in width of third black bar at level of lateral line; caudal fin black, narrowly edged with white; anal fin pale to blackish; scales on dorsal surface of head extend forward to over rear half of pupil; pelvics and pectorals pale; soft dorsal black, edged with white.

8*a*. Second and third (peduncular) pale bars about 2 or 3 scales wide, their width at level of lateral line contained 7 to 10 times in width of third black bar at level of lateral line; second pale bar not extending to distal edge of dorsal fin, ending on basal half of last dorsal spine; posterodorsal part of body blackish; anterior and ventral parts of body pale; spiny dorsal light dusky.

A. tricinctus Schultz and Welander, new species

8*b*. Second and third (peduncular) pale bars 4 to 6 scales wide, their widths at level of lateral line contained from 4 to 6.5 times in width of third black bar at level of lateral line; second pale bar extends into distal half of dorsal but not quite to the edge of that fin; dorsal and posterior half of body blackish; anteroventral part of body pale; spiny dorsal dusky to blackish.

A. mauritiensis Schultz, new species

4*a*. Caudal fin plain pale or plain dusky, no black central blotch edged with white posteriorly; first pale bar on head present.

9*a*. Second pale bar broad, about 7 to 10 scales wide at level of lateral line, and continuing to distal edge of spiny dorsal fin, thence posteriorly along distal edge of soft dorsal; caudal fin pale; caudal peduncle black, without the third pale bar, at least on adults; spiny dorsal, anal, and pelvic fins black; pectoral fin pale; next to last dorsal spine contained about 1.5 in longest dorsal spine; scales on dorsal surface of head extend forward to a line between rear of orbits_____**A. sebae** Bleeker

9*b*. Second pale bar, if present, not continuing to distal edge of dorsal fin; next to last dorsal spine contained 0.8 to 1.2 in longest dorsal spine; scales on dorsal surface of head extend forward to lines between rear edge of orbits to center of pupil.

10*a*. First two pale bars typically present on adults.

11*a*. First two pale bars broad, each about 5 to 7 scales wide at level of lateral line; third (peduncular) pale bar represented by a white bar, posteriorly edged with darkish, or the dark body color on anterior part of caudal peduncle may end abruptly, the white continuing on caudal fin; spiny dorsal black, dusky, or pale; soft dorsal and anal fins pale to black; pelvics pale to black, sometimes edged with black anteriorly; pectoral pale; next to last dorsal spine about 1.2 in longest dorsal spine--------**A. xanthurus** Cuvier and Valenciennes

11*b*. First two pale bars narrow, second usually narrower than first, the latter 3 to 4.5 scales wide and the first 3 to 6 scales wide, at level of lateral line; caudal peduncle blackish, without third pale bar on adults, sometimes pale bar is present on young; dark color of caudal peduncle gradually fading into pale color of caudal fin; spiny dorsal pale to dusky, soft dorsal pale; anal fin pale; pectoral pale; pelvics pale, except anterior edge black; second from last dorsal spine contained from 1.0 to 1.2 times in longest dorsal spine.
A. bicinctus Rüppell

10*b*. First pale bar usually present on head, about 4 to 6 scales wide at level of lateral line; second pale bar lacking, except sometimes on small young specimens.

12*a*. Anal fin pale or partly pale; pelvics with some pale area.

13*a*. Anal fin pale, except distally edged with fine black line; pelvics pale, except anterior edge black; breast pale; dorsal spines X, soft dorsal rays usually 17.
A. ephippium (Bloch)

13*b*. Anal fin pale or distally pale with basal half (or less) dusky to blackish; pelvics pale distally and blackish ventrally, or inner rays pale and outer rays broadly blackish, except distal tips, which are pale; dorsal spines IX or X (more often IX than X), soft dorsal rays usually 17 or 18----------**A. frenatus** Brevoort

12*b*. Anal and pelvic fins black, no pale areas anywhere; dorsal spines X, soft dorsal rays usually 17.
A. melanopus Bleeker

Amphiprion akallopisos Bleeker

PLATE 9, FIGURE A

Amphiprion akallopisos Bleeker, Nat. Tijdschr. Nederl.-Indië, vol. 4, p. 281, 1853.

Prochilus akallopisus Bleeker, Atlas ichthyologique . . . , vol. 9, pl. 400, fig. 3, 1878.

Phalerebus Whitley (new genus), Mem. Queensland Mus., vol. 9, pt. 3, p. 216, 1929 (genotype, *Prochilus akallopisus* Bleeker=*A. akallopisos* Bleeker).

This species is best recognized by the presence of a wide white band from snout along middorsal line of head, thence posteriorly along each side of base of dorsal fin, and ending on dorsal side of caudal peduncle; no white bars are present. Three specimens were studied: USNM 147130, from the Philippine Islands; USNM 82781, from the Fiji Islands; and MCZ 3308, from Sabang Bay.

Amphiprion perideraion Bleeker

PLATE 9, FIGURE B

Amphiprion perideraion Bleeker, Nat. Tijdschr. Nederl-Indië, vol. 9, p. 437, 1855.—Montalban, Bur. Sci. Manila Monogr. 24, p. 16, pl. 4, fig. 1, 1928 (Philippine Islands).

Prochilus perideraion Bleeker, Atlas ichthyologique . . . , vol. 9, pl. 400, fig. 1, 1878.

?*Amphiprion rosenbergi* Bleeker, Acta Soc. Sci. Indo-Neerl., vol. 6, p. 16, 1859; Atlas ichthyologique . . . , vol. 9, pl. 402, fig. 2, 1878.

This species is best recognized by the narrow white band on the middorsal line of head, beginning between front of eyes and extending to dorsal origin, and a narrow white vertical bar on rear of head behind eye. Four specimens were studied: USNM 141032, 141033, and 147129, from the Marshall Islands and Borneo; and MCZ 33409, from Amboina.

Amphiprion percula (Lacepède)

PLATE 9, FIGURE C

Lutjanus percula Lacepède, Histoire naturelle des poissons, vol. 4, pp. 194, 239, 240, 1802 (New Britain).

Amphiprion tunicatus Cuvier and Valenciennes, Histoire naturelle des poissons, vol. 5, p. 399, pl. 132, fig. 2, 1830 (Vanicolo).—Lesson, Voyage . . . La *Coquille* . . . , Zoologie, vol. 2, pt. 1, p. 192, pl. 25, fig. 3, 1830 (Port Praslin, New Ireland; Doreh, New Guinea).

Prochilus percula Bleeker, Atlas ichthyologique . . . , vol. 9, pl. 400, fig. 2, 1878.

Anthias polymnus var. (non Linnaeus) Bloch, Naturgeschichte der ausländischen Fische, vol. 6, p. 103, pl. 316, fig. 3, 1792.

Amphiprion percula Günther, Journ. Mus. Godeffroy, vol. 15, Andrew Garrett's Fische der Südsee, pt. 7, pl. 124, fig. A, 1881 (Samoan Islands).—Day, The fishes of India . . . , vol. 2, p. 379, pl. 80, fig. 4, 1878 (Andamans).—Montalban, Bur. Sci. Manila Monogr. 24, p. 14, pl. 2, fig. 2, 1928 (Philippine Islands).

Actinicola percula Aoyagi, Coral Fishes, Tokyo, pl. 37, fig. 2, 1943 (Kakure-Kumanomi); Biogeographica, Trans. Biogeogr. Soc. Japan, vol. 4, No. 1, p. 175, pl. 9, fig. 2, 1941 (Japan).

Amphiprion bicolor Castelnau, Proc. Zool. Acclim. Soc. Victoria, p. 92, 1873 (Port Darwin).

Actinicola bicolor (Castelnau) Whitley, Mem. Queensland Mus., vol. 9, pt. 3, p. 215, pl. 27, fig. 2, 1929 (Port Darwin).

This is the most characteristically colored species in the genus *Amphiprion*, and is one of the commonest seen associated with the sea anemone *Discosoma*. The second white bar has a forward projection under the depressed pectoral fin. No other species of *Amphiprion* observed by me has the forward edge of the second dark bar with a deep concavity. The centers of the dark bars on the sides may be pale brown to blackish; all dark bars are black edged. I have studied 20 lots, totaling 35 specimens, from the Philippine, Solomon, Palawan, Schouten, and Morotai Islands.

TABLE 1.—*Fin-ray counts recorded for certain species of* Amphiprion

	Dorsal									Anal					Pectoral					
	IX	X	XI	14	15	16	17	18	19	II	12	13	14	15	16	17	18	19	20	21
ephippium																				
north Australia, near Darwin		12				2	9	1		12		1	8	3			3	8	1	
melanopus																				
Marshall Islands		10	1		1	2	8			6		1	5					6	5	
Samoan and Paumoto Islands		4					4			3			3				3	1		
frenatus																				
Philippine Islands	23	10				2	19	12		16			16				5	23	2	
Okinawa and Japan	2						1	1		2			2				1	3		
akallopisos		3						2	1	3	1	1	1			1	2	1		
perideraion		4				4				3	1	3				5				
chrysogaster		6	2	?1	1	2	5			8		1	7				1	3	8	2
bicinctus		5	1		1	2	3			6		2	3	1			1	1	3	1
mauritiensis		9	1			1	8	1		10		1	9						12	8
tricinctus		1					1			1			1						1	
xanthurus		11	1		3	8	1			11		4	5	1				7	5	
percula		7			4	3				7	6	1			7					
sebae		2				1	1			2			1	1					2	

Amphiprion laticlavius Cuvier and Valenciennes

PLATE 9, FIGURE D

Amphiprion laticlavius Cuvier and Valenciennes, Histoire naturelle des poissons, vol. 5, p. 394, pl. 132, fig. 1, 1830 (New Guinea).
Amphiprion bifasciatus (non Bloch) Montalban, Bur. Sci. Manila Monogr. 24, p. 15, pl. 3, fig. 1, 1928 (Philippine Islands).
Amphiprion bifasciatus annamensis Chevy, Travaux l'Inst. Océanogr. Indochine, Mem. 4, pt. 1, poissons, p. 99, pl. 39, 1932 (Sud-Annam).
Prochilus bifasciatus (non Bloch) Bleeker, Atlas ichthyologique . . . , vol. 9, pl. 400, fig. 4, 1878.
Amphiprion polymnus (non Linnaeus) Aoyagi, Coral Fishes, Tokyo, pl. 36, fig. 2, 1943 (Toaki-Kumanomi); Biogeographica, Trans. Biogeogr. Soc. Japan, vol. 4, No. 1, p. 173, pl. 12, fig. 4, 1941 (Japan).
Amphiprion unimaculatus (non Meuschen) Okada and Ikeda, Biogeographica, Trans. Biogeogr. Soc. Japan, vol. 3, No. 2, p. 202, fig. 28, 1939 (Itoman, Okinawa).

This species differs from all others in regard to the second white bar, which is represented by an ovate white area on upper half of body and on soft dorsal fin, but without any extension on ventral part of body. Third white bar on caudal peduncle is lacking. Caudal fin is basally and centrally blackish, with posterolateral edges white. Anal is submarginally blackish, with distal edge white. One specimen, USNM 147128, from the Philippines, was studied.

Amphiprion chrysogaster Cuvier and Valenciennes

PLATE 9, FIGURE E

Amphiprion chrysogaster Cuvier and Valenciennes, Histoire naturelle des poissons, vol. 5, p. 400, 1830 (Île de France)—Lesson, Voyage . . . La *Coquille*, . . . , Zoologie, vol. 2, pt. 1, p. 191, pl. 28, fig. 3, 1830 (Île de France).
Amphiprion percula (non Lacepède) Okada and Ikeda, Biogeographica, Trans. Biogeogr. Soc. Japan, vol. 3, No. 2, p. 200, pl. 6, fig. 1, 1939 (Riu Kiu Islands).
Amphiprion trifasciatus Cuvier and Valenciennes, Histoire naturelle des poissons, vol. 5, p. 595, 1830 (Moluccas).
Amphiprion fusciventer Bennett, Proc. Comm. Zool. Soc. London, vol 1, p. 165, 1831 (Mauritius).
Prochilus bifasciatus (non Bloch) Bleeker, Atlas ichthyologique . . . , vol. 9, pl. 400, fig. 6, 1878.

This species, with three broad white bars, has the central part of caudal fin black and outer edges white; second white bar is continuous on distal part of soft dorsal fin. Seven specimens were studied: One each in USNM 61690 from Mauritius, 141034 from the Marshall Islands, 147127 from the Philippines; and four MCZ specimens, three from Zanzibar, Africa, and one, collected by Andrew Garrett, from Apiang, Kingsmill Islands.

Amphiprion polymnus (Linnaeus)

PLATE 9, FIGURE J

Perca polymna Linnaeus, Systema naturae, ed. 10, p. 291, 1758.

Anthias bifasciatus Bloch, Naturgeschichte der ausländischen Fische, vol. 6, p. 103, pl. 316, fig. 2, 1792.

Prochilus bifasciatus Bleeker, Atlas ichthyologique . . . , vol. 9, pl. 400, fig. 5, 1878.

?*Amphiprion ocellaris* Cuvier and Valenciennes. Histoire naturelle des poissons, vol. 5, p. 399, 1830 (Sumatra).

?*Amphiprion melanurus* Cuvier and Valenciennes, Histoire naturelle des poissons, vol. 5, p. 400, 1830 (Sumatra).

Lutjanus jourdin Lacepède, Histoire naturelle des poissons, vol. 4, pp. 191, 235, 1802 (Amboina).

Coracinus seu *Sciaena unimaculata* Meuschen, Zoophylacium Gronovianum . . . , Pisces, No. 227, 1781 (based on Gronow, 1763).

Coracinus vittatus Gray, Catalogue of fish collected and described by L. T. Gronow . . . , British Museum, p. 57, 1854 (based on Gronow's No. 227).

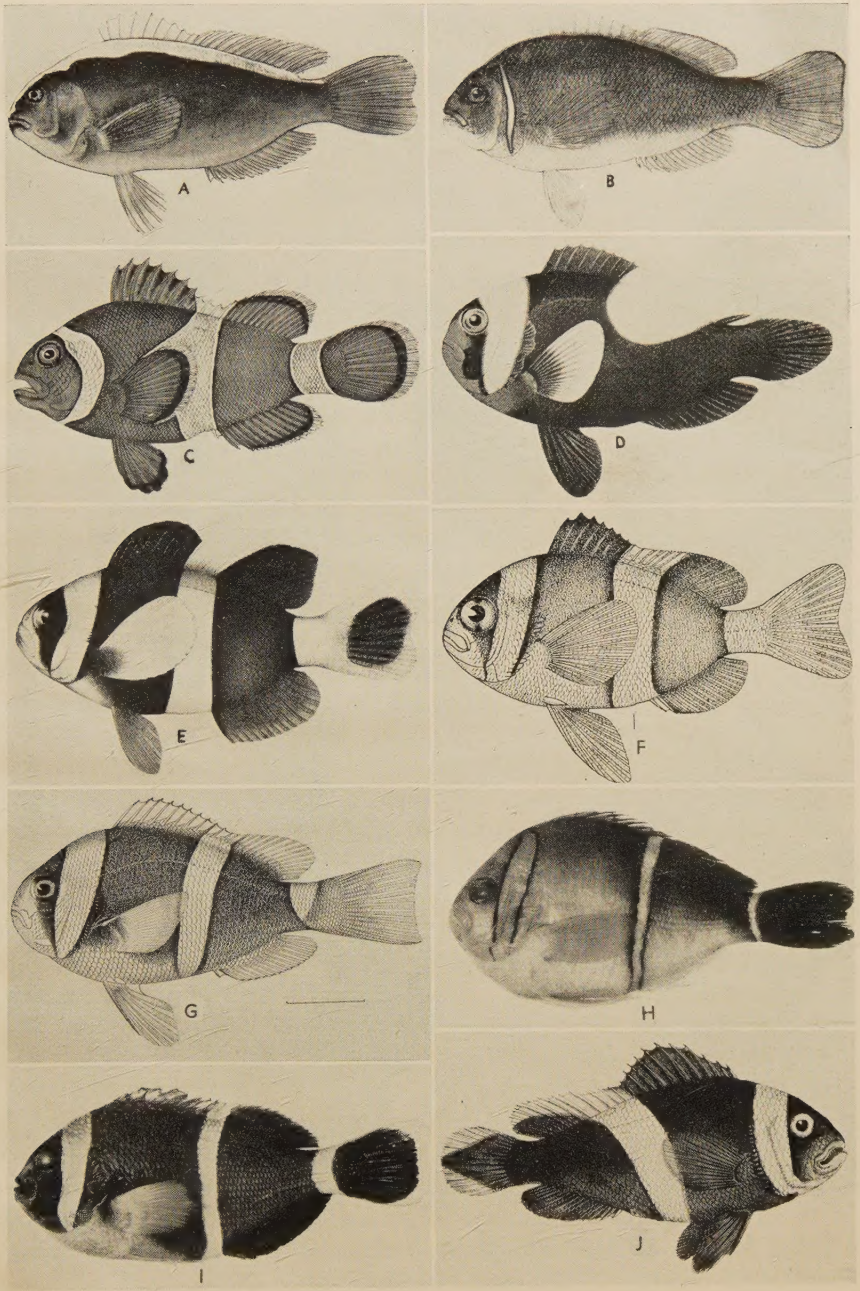
Amphiprion intermedius Schlegel and Müller, Verhandelingen over de Natuurlijke Geschiedenis der Nederlandsche Overzeesche Bezittingen . . . , Zoologie, p. 18, 1839–1841 (reference copied).

Amphiprion polymnus (Linnaeus) has been confused almost since the day it was named. Weber and de Beaufort (Fishes of the Indo-Australian Archipelago, vol. 8, p. 344, 1940) discuss the confusion between *polymnus* and *bicinctus*, the former name having been used for the species currently called *bicinctus*.

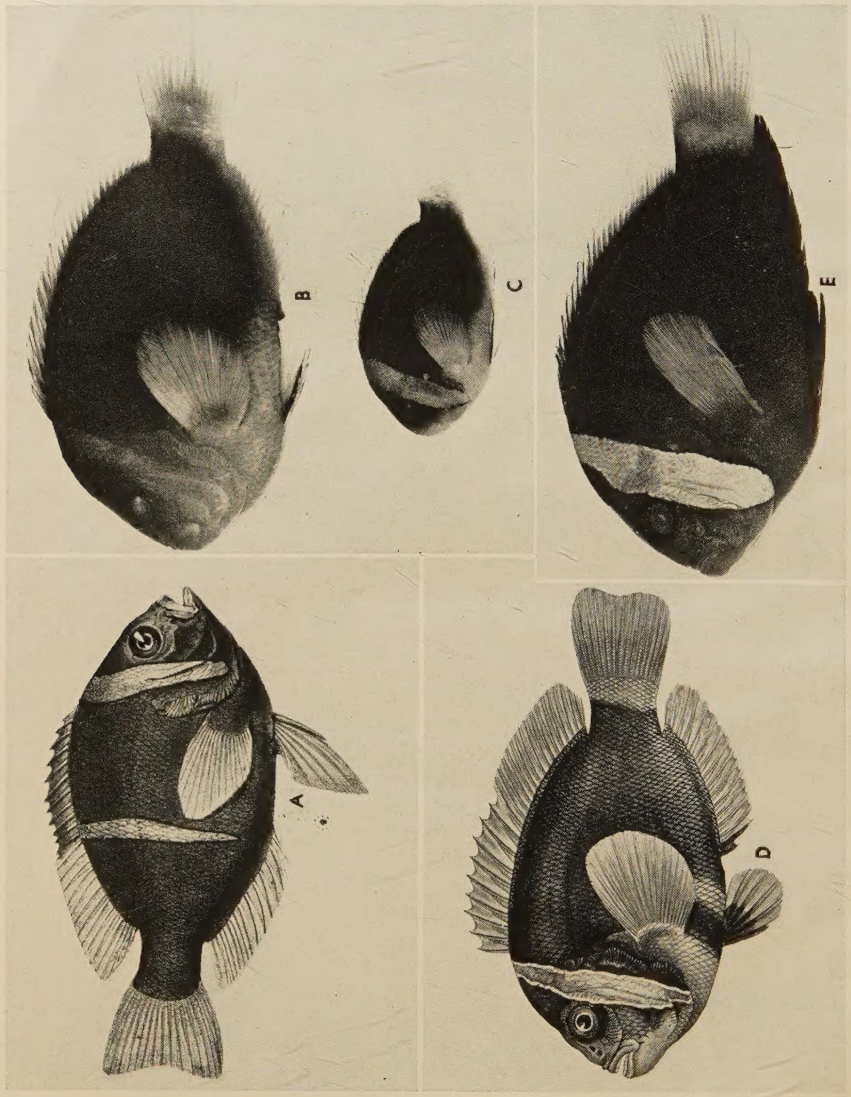
In *A. polymnus* the second white bar continues on to the distal part of the soft dorsal, but it lacks the third white bar on the caudal peduncle; also, the black coloration of the caudal peduncle continues on to the central part of the caudal fin, whereas in *A. sebae* the caudal fin is pale. The anal fin is black basally, with the distal third white.

EXPLANATION FOR PLATE 9

A, *Amphiprion akallopisos* Bleeker, photograph of a color drawing in the Philippine *Albatross* collection; B, *A. perideraion* Bleeker, photograph of a color drawing in the Philippine *Albatross* collection; C, *A. percula* (Lacepède), photograph of a color drawing in the Philippine *Albatross* collection; D, *A. laticlavius* Cuvier and Valenciennes, photograph of plate 36, figure 2, in Aoyagi, Coral Fishes, 1943 (= *A. polymnus*, non Linnaeus, Aoyagi); E, *A. chrysogaster* Cuvier and Valenciennes, photograph of plate 6, figure 1, in Okada and Ikeda, Biogeographica, Trans. Biogeogr. Soc. Japan, vol. 3, No. 2, 1939 (= *A. percula*, non Lacepède, Okada and Ikeda); F, *Amphiprion sebae* Bleeker, photograph of figure 27 in Okada and Ikeda, Biogeographica, Trans. Biogeogr. Soc. Japan, vol. 3, No. 2, 1939; G, *A. xanthurus* Cuvier and Valenciennes, copy of figure 4 in Jordan and Dickerson, Proc. U. S. Nat. Mus., vol. 34, p. 611, 1908, of a specimen from Suva, Fiji; H, *A. tricinctus*, new species, holotype, USNM 152929, from Bikini Atoll, Amen Island, standard length 75 mm.; I, *A. mauritiensis*, new species, holotype, MCZ 6093, from Mauritius, standard length 111.5 mm.; J, *A. polymnus* (Linnaeus), photograph of plate 316, figure 2, Bloch, Naturgeschichte der ausländischen Fische, vol. 6, 1792 (= *Anthias bifasciatus* Bloch).



Certain species of *Amphiprion*
(For explanation, see facing page)



A, *Amphiprion bicinctus* Rüppell, copy of plate 35, figure 1, in Atlas, Fische des Rothen Meeres, 1828; B and C, *A. ephippium* (Bloch), large and small specimen, USNM 152777, collected by Dr. R. R. Miller in Woods Inlet, west of Darwin, Australia; D, *A. frenatus* Brevoort, photograph of a color drawing in the Philippine *Albatross* collection; E, *A. melanopus* Bleeker, specimen from Bikini, USNM 141026.

I have examined one specimen collected June 16, 1948, by Dr. Robert R. Miller in "a submerged canoe on a sand bar in Little Lagoon, northeast end of Groote Eylandt, Gulf of Carpentaria, Australia." The color when alive was as follows: "The pale bars were coral pink, with narrow emerald borders; the dark bars were velvet-black."

Amphiprion tricinctus Schultz and Welander, new species

PLATE 9, FIGURE H

Amphiprion ephippium (non Bloch) var. *chrysopterus* (non Cuvier and Valenciennes) Günther, Journ. Mus. Godeffroy, vol. 15, Andrew Garrett's Fische der Südsee, pt. 7, pp. 224–225, pl. 122, fig. C, 1881 (Kingsmill Islands).

Holotype.—USNM 152929, Bikini Atoll, Amen Island, lagoon, August 21, 1947, University of Washington, Staff of Applied Fisheries Laboratory, standard length 75 mm.

Description.—Dorsal fin rays X,17; anal II,14; pectoral ii,17,i to ii,16,ii; pelvics I,5; branched caudal fin rays 8+7; vertical scale rows from upper edge of gill opening to base of caudal fin 54, scales between lateral line and base of first soft dorsal ray 5, and between lateral line and anal origin 20; pores in lateral line 36; predorsal scales 19 or 20; gill rakers 5+1+13.

Detailed measurements were made on the holotype and these data are expressed in thousandths of the standard length, 75 mm.: Greatest depth 560; length of head 272; snout 99; eye 95; least preorbital 35; length from snout tip to rear edge of maxillary 101; postorbital length of head 147; least width of interorbital space 100; least depth of caudal peduncle 160; length of caudal peduncle from base of last anal ray to midbase of caudal fin 192; length of longest ray of pectoral 287, pelvic 313, upper caudal fin 307, lower lobe of caudal fin 300, spiny dorsal 160; length of next to last dorsal spine 160; width of white part of first pale bar at level of lateral line 73, second 40, last (peduncular) 20.

Depth of body 1.7, head 3.4, both in standard length. Snout 3.2; eye 3.1; least preorbital distance 8.0; upper jaw 2.8; postorbital part of head 2.0; least interorbital space 3.0; least depth of caudal peduncle 1.8; length of pectoral fin 1.0, pelvic 0.9, second dorsal spine 23, upper caudal rays 0.9 to 1.0; all in length of the head. Least depth of caudal peduncle in its length 1.2. Angle of upper profile of head with lengthwise axis of body about 50°; profile of head convex.

Teeth in both jaws in a single row, nearly conical, a little compressed forward, pointed; interorbital space scaled forward to a line between middle of pupils; 4 or 5 rows of scales on cheeks; gill cover with a few scales; scales occur part way out on all median fins; preorbital with 3 spines; suborbital with 10 to 12 smaller spines.

Color in alcohol.—Background coloration of body from about fifth dorsal spine posteriorly and dorsally to midlengthwise axis of body blackish, the anteroventral part of body pale light brown becoming paler ventrally; spiny dorsal dark brown; soft dorsal black; caudal fin black, except edged with white posteriorly; pectoral and pelvic fins pale or very light tan; anal pale or light tan, distally edged with a black line; first white bar begins a little in front of dorsal origin and just behind eye, ending on lower edge of subopercle; second white bar begins on last dorsal spine and base of first soft ray in lower third of fin, extends ventrally, meeting its fellow in narrow space between anal origin and anus; third white bar, about half width of second, or narrower than width of pupil, crosses caudal peduncle just in front of caudal fin base.

Remarks.—This new species may be recognized by the narrowness of the three white bars, especially the second and third, and by the black caudal fin narrowly edged with white posteriorly. It is separated from all other species of *Amphriprion* by the key.

Named *tricinctus* in reference to the three white bars.

Amphiprion mauritiensis Schultz, new species

PLATE 9, FIGURE I

Holotype.—MCZ 6093, Mauritius, collected by Nicolas Pike, standard length 111.5 mm.

Paratypes.—Bearing same data as holotype: Out of MCZ 6093, 4 specimens, 67 to 96 mm.; MCZ 5801, 2 specimens, 98 and 104.5 mm.; MCZ 5800, 1 specimen, 101.5 mm.; MCZ 5802, 2 specimens, 83.5 and 114 mm.

Description.—Dorsal rays X,17 or 18, one with XI,16, usually X,17; anal III,14, one with III,13; pectoral rays 20 or 21; pelvics I,5; branched caudal fin rays 8+7; vertical scale rows from upper edge of gill opening to base of caudal fin about 55 to 58; scales between lateral line and base of first soft dorsal ray 5; between lateral line and anal origin 17 to 19; pores in lateral line 35 to 42; predorsal scales about 10 or 11; gill rakers 5+1+13.

Detailed measurements were made on the holotype and two paratypes, and these data are expressed in thousandths of the standard length, first for the holotype then, in parentheses, for the paratypes: Standard length in mm. 111.5 (87.5; 104.5). Greatest depth 485 (490; 535); length of head 297 (286; 310); snout 90 (97; 96); eye 89 (86; 86); least preorbital width 31 (38; 28); distance from snout tip to rear edge of maxillary 91 (114; 112); least width of interorbital space 74 (91; 81); least depth of caudal peduncle 144 (157; 151); length of caudal peduncle 166 (153; 148). Length of longest ray of

pectoral 279 (269; 280); pelvic 291 (257; 296); upper caudal lobe 270 (280; 296); lower caudal lobe 265 (263; 277); spiny dorsal 135 (132; 124). Length of next to last dorsal spine 99 (86; 86). Width of first white bar at level of lateral line 81 (80; 67); second 71 (74; 57); third (peduncular) 48 (63; 48). Width of second black bar at level of lateral line 323 (331; 344); third 300 (292; 344).

Depth of body 1.8 to 2.1, head 3.2 to 3.5, both in standard length. Snout 2.9 to 3.2; eye 3.3 to 3.6; least preorbital 7.5 to 10.1; upper jaw 2.5 to 3.2; least interorbital 3.1 to 3.9; least depth of caudal peduncle 1.9 to 2.0, length of pectoral 1.1, pelvic 1.0 to 1.1, third dorsal spine 2.1 to 2.5; all in length of head. Least depth of caudal peduncle in its length 0.95 to 1.2. Width of second white bar at level of lateral line in width of third black bar at level of lateral line 3.5, third white bar 4.0 to 7.0.

Profile of head convex. Teeth uniserial, nearly conical, a little compressed forward, pointed; interorbital space scaled forward to a line between rear of eyes; 4 to 6 rows of scales on cheek; gill cover with a few scales; scales occur part way out on all median fins; preorbital with 1 to 3 spines; suborbital with about a dozen spines.

Color in alcohol.—Background coloration dark brownish or blackish, except that underside of head and ventrally below a line from pectorals to anus is white or pale; three white bars, one behind eye, second from origin of soft dorsal to anus, third on caudal peduncle; dorsal fin black, with distal edge of soft dorsal white; anal fin black or pale, if black, distal edge is white; pelvics pale; pectoral pale, except dusky basally on some specimens; central area of caudal fin blackish, edges white, with edge widest distally; gill membranes appear to be white.

Remarks.—This new species is most closely related to *A. tricinctus* but differs in having wider white bars, as compared in the key. Named *mauritiensis* in reference to the locality where it was collected.

Amphiprion sebae Bleeker

PLATE 9, FIGURE F

Amphiprion sebae Bleeker, Nat. Tijdschr. Nederl.-Indië, vol. 4, p. 478, 1853; Atlas ichthyologique . . ., vol. 9, pl. 400, fig. 9, 1878.—Day, Fishes of India . . . , vol. 2, p. 378, pl. 80, fig. 3, 1878 (Andamans).—Okada and Ikeda, Biogeographica, Trans. Biogeogr. Soc. Japan, vol. 3, No. 2, p. 200, fig. 27, 1939 (Isigaki and Irimote Islands).

This species, in which the second white color bar continues distally on the soft dorsal fin, is very much like *A. polymnus*, but differs in having a white bar on the caudal peduncle and a white caudal fin. Three specimens were studied: USNM 45169, from the Seychelles, and 133830, from the Paumotu Islands; and MCZ 33410, from Sumatra.

Amphiprion xanthurus Cuvier and Valenciennes

PLATE 9, FIGURE G

Amphiprion xanthurus Cuvier and Valenciennes, Histoire naturelle des poissons, vol. 5, p. 402, 1830 (Île de France).

Amphiprion clarckii Cuvier and Valenciennes, Histoire naturelle des poissons, vol. 9, p. 504, 1833 (emended spelling on Bennett).

Anthias clarkii Bennett, A selection from . . . fishes found on the coast of Ceylon, London, ed. 2, p. 29, pl. 29, 1834 (Ceylon).

Sparus milli Bory de Saint-Vincent, Dictionnaire classique d'histoire naturelle, vol. 17, p. 130, pl. 113, fig. 2, 1831 (China Sea).

Prochilus polymnus (non Linnaeus) Bleeker, Atlas ichthyologique, vol. 9, pl. 400, figs. 7, 8, 1878.

Anthias polymna (non Linnaeus) Bloch, Naturgeschichte der ausländischen Fische, vol. 9, p. 89, pl. 316, fig. 1, 1792.

Amphiprion bicinctus (non Rüppell) Aoyagi, Coral Fishes, Tokyo, pl. 37, fig. 1, 1943 (Kumanomi).—Biogeographica, Trans. Biogeogr. Soc. Japan, vol. 4, No. 1, p. 169, pl. 9, fig. 1, 1941 (Japan).

Amphiprion polymnus (non Linnaeus) Okada and Ikeda, Biogeographica, Trans. Biogeogr. Soc. Japan, vol. 3, No. 2, p. 204, fig. 30, 1939 (Riu Kiu Islands).—Montalban, Bur. Sci. Manila Monogr. 24, p. 10, pl. 1, fig. 1, 1928 (Philippine Islands).

Amphiprion chrysopterus Cuvier and Valenciennes, Histoire naturelle des poissons, vol. 5, p. 401, 1830 (no locality given).—Jordan and Dickerson, Proc. U. S. Nat. Mus., vol. 34, p. 612, fig. 4, 1908 (Suva, Fiji).

Amphiprion japonicus Temminck and Schlegel, Fauna Japonica . . . , Pisces, p. 66, 1843 (Japan).

Amphiprion chrysargyrus Richardson, Rep. Meetings British Assoc. Adv. Sci., vol. 15 (1845), p. 254, 1846 (Seas of China and Japan).

Amphiprion boholensis Cartier, Verh. phys. med. Würzburg, new ser., vol. 5, p. 96, 1874 (Bohol).

Amphiprion melanostolus Richardson, Ann. Mag. Nat. Hist., vol. 9, p. 390, 1842 (Depuch Island).

?*Amphiprion de bojer* Lienard, Treizième Rapp. Ann. Soc. Hist. Nat. Maurice, p. 68, 1843 (reference copied).

Amphiprion snyderi Ishikawa, Proc. Nat. Hist. Tokyo Mus., vol. 1, No. 1, p. 11, pl. 5, 1904 (Bonin Island).

I have examined 70 specimens (in 45 lots) of *xanthurus*, 22 of which are in the Museum of Comparative Zoology, Harvard University, and the others in the U. S. National Museum, and I find some variation in color pattern. Among these specimens 12 had black dorsal, anal, and pelvic fins; 3 had these three fins dusky; 10 had the dorsal and the anal black or dusky, with pelvics pale; 36 had the dorsal black and both anal and pelvics pale; 9 had dorsal, anal, and pelvics pale, except in some specimens the pelvic fins were dark edged. Of these 70 specimens 42 were from the Philippines, 4 were from Japan, 2 from the China coast, 18 from Zanzibar, 1 from the Gilbert Islands, and 3 from Kingsmill Islands.

Amphiprion bicinctus Rüppell

PLATE 10, FIGURE A

Amphiprion bicinctus Rüppell, Atlas zu der Reise im nördlichen Afrika, p. 139, pl. 35, fig. 1, 1828 (Red Sea).

Amphiprion papuensis Macleay, Proc. Linn. Soc. New South Wales, vol. 8, No. 2, p. 271, 1883 (New Guinea).—Whitley, Mem. Queensland Mus., vol. 9, pt. 3, p. 210, pl. 27, fig. 1, 1929 (D'Entrecasteaux Group, New Guinea, on holotype).

Amphiprion arion De Vis, Proc. Linnean Soc. New South Wales, vol. 8, p. 450, 1884 (South Seas).

This species has the first two white bars but lacks the peduncular bar; the anterior edges of the pelvics are black and the caudal fin is pale. Six lots containing seven specimens were studied: USNM 61679, from Suva, Fiji; USNM 141030 and 141031, from the Marshall Islands; uncataloged specimens, one from the Paumotu and two without data; also one from Bikini in the University of Washington collection.

Among these specimens, four adults, 82 to 99 mm. in standard length, have a pale anal fin, whereas two, 26 and 27 mm. long, have a black anal, and one, 25 mm. long, has a dusky anal fin. The caudal peduncle varies from pale dusky to black or brownish. The key gives the essential color pattern of this species.

Amphiprion ephippium (Bloch)

PLATE 10, FIGURES B, C

Lutjanus ephippium Bloch, Naturgeschichte der ausländischen Fische, vol. 4, p. 121, 1790 (reference not seen); Ichthyologie, ou histoire naturelle, générale et particulière des poissons . . . , vol. 7, p. 98, pl. 250, fig. 2, 1797 (East Indies).

Amphiprion ephippium Day, Fishes of India . . . , vol. 2, p. 378, pl. 80, fig. 1, 1878.

Amphiprion monofasciatus Thiollière *in* Montrouzier, Suite de la faune de l'Île de Woodlark ou Moiou, Ichthyologie, Ann. Sci., Physic. Nat. Agr. Indust., Lyon, vol. 8, p. 476, 1856 (Woodlark Island).

Amphiprion tricolor Günther, Catalogue of the fishes in the British Museum, vol. 4, p. 8, 1862 (Port Essington; South Australia).

Amphiprion rüppeli Castelnau, Proc. Zool. Acclim. Soc. Victoria, vol. 2, p. 91, 1873 (Port Darwin).

Amphiprion frenatus (non Brevoort) Day, Fishes of India . . . , vol. 2, p. 378, pl. 80, fig. 2, 1878.

Prochilos ephippium Bleeker, Atlas ichthyologique . . . , vol. 9, pl. 401, figs. 1, 9, 1878.

Amphiprion rubrocinctus Richardson, Ann. Mag. Nat. Hist., vol. 9, p. 391, 1842 (Depuch Island; probably young).

The adults of this species usually have a plain blackish body and head, with a single white color bar on the head, but on a few specimens, the largest in the series, this first white bar is lacking or nearly

so. The smallest specimens among 57 collected by Dr. Robert R. Miller from Woods Inlet west of Darwin, Australia, have a variable color pattern of two or three white bars. One specimen, 20 mm. in standard length, has only one white bar on the head; 9, from 20 to 31 mm., have two white color bars, the first and second; 7, from 19.5 to 28 mm., have the first and second white bars distinct and the third indistinct, sometimes represented by a white spot on dorsal edge of caudal peduncle; 10, from 17 to 25 mm., have all three white color bars distinct. I presume that the second and third white bars disappear with increase in size, since a 35-mm. specimen in this lot looks like all the larger specimens with only one white bar on the head.

Amphiprion frenatus Brevoort

PLATE 10, FIGURE D

Amphiprion frenatus Brevoort, U. S. Japan Exped. Nat. Hist., Washington, vol. 2, p. 263, pl. 6, fig. 4, 1856 (Lew Chew [Okinawa]).—Jordan and Snyder, Proc. U. S. Nat. Mus., vol. 24, p. 597, 1902.—Montalban, Bur. Sci. Manila Monogr. 24, p. 12, pl. 2, fig. 1, 1928 (Philippine Islands).—Aoyagi, Biogeographica, Trans. Biogeogr. Soc. Japan, vol. 4, No. 1, p. 167, 1941 (Japan).—Okada and Ikeda, Biogeographica, Trans. Biogeogr. Soc. Japan, vol. 3, No. 2, p. 203, fig. 29, 1939 (Riu Kiu Islands).

Prochilus polylepis Bleeker, Versl. Akad. Wet. Amsterdam, ser. 2, vol. 11, p. 135, 1877; Atlas ichthyologique . . . , vol. 9, pl. 401, fig. 6, 1878.

Amphiprion polymnus (non Linnaeus) Montalban, Bur. Sci. Manila Monogr. 24, p. 10, pl. 1, fig. 1, 1928 (Philippines).

I have studied 72 specimens from the Philippines, Okinawa, and Japan referable to this species. In alcohol two color phases are evident, the usual one (53 specimens, ranging from 37 to 100 mm. in standard length) has a plain blackish body behind head, whereas 15, ranging from 39 to 60 mm., have 3 lengthwise pale bands on side of body, and 4 others are intermediate in regard to coloration. These pale bands at best are not very distinct. This species is characterized by having about twice as many of the specimens with IX dorsal spines as with X; this latter figure is the usual number of dorsal spines in the other species of *Amphiprion*.

Of 78 specimens in 54 lots studied, 76 were from the Philippine Islands and one each from Japan and Okinawa. The specimen from Okinawa (the type locality of *frenatus*), USNM 71702, Naha, Okinawa, *Albatross*, 69 mm. in standard length, is herewith designated as neotype of *Amphiprion frenatus* Brevoort since the type is not in existence.

Amphiprion melanopus Bleeker

PLATE 10, FIGURE E

Amphiprion melanopus Bleeker, Nat. Tijdschr. Nederl. Indië, vol. 3, p. 561, 1852.
Prochilus melanopus Bleeker, Atlas ichthyologique . . . , vol. 9, pl. 401, fig. 7, 1878.
Prochilus macrostomus Bleeker, Atlas ichthyologique . . . , vol. 9, pl. 401, fig. 5, 1878.
Amphiprion ephippium (non Bloch) Günther, Journ. Mus. Godeffroy, vol. 15, pt. 7, pl. 122, fig. D (var. *melanopus* on p. 225), 1881.
Amphiprion mccullochi Whitley, Mem. Queensland Mus., vol. 9, pt. 3, p. 213, 1929 (Lord Howe Island).
Amphiprion macrostoma (non Bleeker) Chevy, Travaux Inst. Oceanogr. Indo-Chine, Mem. 4, pt. 1, Poissons, p. 102, pl. 40, 1932 (Annam).

This species is characterized by the single white bar on the head, plain black body, pale soft dorsal, caudal, and pectoral, and black pelvics and anal fins.

Of 18 specimens in 7 lots studied, 14 were from the Marshall Islands, 3 from Apia, Samoa, and 1 from Paumotu Island.

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